



MODEL AF-105
OPERATOR'S
MANUAL

50,000 OHMS PER VOLT DC
10,000 OHMS PER VOLT AC

BURN-OUT PROOF

Hioki **HIOKI ELECTRIC CO, LTD.**

Printed in Japan

* SPECIFICATIONS

DC Voltage: 0 - 0.3, 3, 12, 60, 120, 300, 600, 1,200V
at 50,000 Ω /V

AC Voltage: 0 - 6, 30, 120, 300, 600, 1,200V at 10,000
 Ω /V

Audio Output Voltage: 0 - 6, 30, 120, 300, 600, 1,200V

DC Current: 0 - 30 μ A, 6, 60, 300mA, 12A

Resistance: 0 - 10K, 1M, 10M, 100M Ω

Decibel: -20 to +17dB (Reference: 0dB = 0.775V = 1mW
in 600 Ω)

Overload Protection Circuit: Zener Diode (1S990) \times 2
Condenser (0.05 μ F) \times 1

Battery: UM-3(1.5V) \times 2, BL-015(22.5V) \times 1

Size & Weight: 6-3/5" \times 4-2/5" \times 1-4/5", 660grams

Fundamental Sensitivity of the meter movement: 20 μ A

Internal Resistance of the meter movement: 2,000 Ω

Allowance: For DC Voltage \pm 3% of specified value
For AC Voltage \pm 4% of specified value
For DC Current \pm 3% of specified value
For Resistance \pm 3% of scale length

Equipment Supplied: Red & Black Test Leads

Accessory Available: High Voltage Probe for 30,000V DC
range.

* GENERAL REMARKS FOR USE

1. To put tester in operation, select suitable range.
2. Select most suitable range. For example, to check AC 100V, select the position for AC 120V range. To check batteries having 1.5V output, the selector to be positioned to DC 3V range. It is basically understood for the best measurement select a range closest to the range to an expected value. For resistance range measurements select a position so the pointer comes near center of the scale.
3. When the value to be measured is unknown, check first with the highest value range. Thus, a rough value can be found.
4. Resistance measurement is prohibited in an operating circuit. Measurement of any circuit having capacitors must be made only after those capacitors have been completely discharged.

5. Do not store the tester in any hot or humid place. Avoid magnetic fields.
6. This tester has a switch for meter polarity change. It is to be used when the pointer swings in reverse direction and the test lead could not be detached easily. Note, however, that this switch should be turned for +DC, AC.V, OHM when the tester is used in ordinary way.

* DC VOLTAGE (DC.V) MEASUREMENT

For voltage measurement, use the tester in parallel connection to the circuit. For up to 600V from 0.3V, the red test lead to be connected to the terminal (+), and black one to the terminal (-). For testing make contact of the tip of red test lead to (+) side of the circuit to be checked, and black one to (-) side.

To use 1,200V range, the red test lead to be connected to the terminal indicated as DC 1.2KV. The black one to the terminal (-). The selector knob position for DC 600V.

To check up high tension circuit more than 10,000V, take up the high tension probe for 30,000V. The red test lead of the probe to be connected to the terminal +30KV PROBE, and black one to the terminal (-) as usual. The selector knob position to be set for DC 600V.

When the pointer swings in reverse direction due to unknown polarity, turn the polarity switch to the side indicated as (-) DC.

* DC CURRENT (DC.A) MEASUREMENT

For up to 300mA from 0.03mA, the red test lead to be connected to the terminal (+) and black one to the terminal (-). The selector knob to be set to the desired range.

When the range for DC 12A is used, connection of the red test lead must be changed to the terminal so indicated as DC 12A. The black test lead as usual. The selector position in this case, set at the position so indicated as 300mA, 12A.

If the pointer swings in reverse direction owing to unknown polarity, turn the polarity switch to -DC side as in case of DC voltage measurement.

* AC VOLTAGE (AC.V) MEASUREMENT

For voltage measurement, use this tester in parallel

connection to the circuit. For up to 600V from 6V, the red test lead to the terminal (+) and black one to the terminal (-). The range selector knob to be set at proper range.

For AC 1,200V range, the red test lead must be connected to the terminal indicated as AC 1.2KV keeping the black one as usual. The range selector to be set at the position for 600V range.

For AC, the polarity switch is turned to the side indicated as +DC, AC.V, OHMS.

NOTE: The output of an ordinary radio transformer has higher voltage than its standard rating when not loaded. Keep this matter in mind for actual operation.

* AUDIO OUTPUT (AC.V) MEASUREMENT

The red test lead to be connected to the terminal OUTPUT and the black one as usual. Proceed in the same way as for AC voltage measurement.

* RESISTANCE (OHM) MEASUREMENT

1. Zero Ohm Correction

Prior to resistance measurement, make a short circuit between the tips of red and black test leads. The pointer swings toward the right end of the scale. Make zero adjustment with the adjusting knob so that the pointer just stops on zero ohm point of the scale. This operation must be made at any time when resistance measurement is done or at each occasion to set the selector at another resistance range.

2. Direction

Because of the principle of the meter movement, measurement can be made more accurately if the value is read at a point near center of the scale.

Avoid finger touching the tips of test lead.

If the pointer does not reach zero ohm point or the pointer shows fluctuation at the time of zero adjustment in the range of $R \times 1$, replace the self contained battery. Replacement can be done upon taking off the back housing.

3. Polarity For Resistance Measurement

For the ohm range of this tester, the terminals have opposite polarity to the indication. This is one to the fact that (-) side of the self contained battery is connected to (+) terminal and (+) side to (-) terminal of the tester.

REMARKS: If the circuit employs a semi-conductor, polarity may affect the result of resistance measurement. To make the result sure, measure once again upon changing polarity. If the circuit employ capacitors, resistance measurement must be made after those capacitors are completely discharged.

* DECIBEL (dB) MEASUREMENT

The measurement is made as for AC voltage measurement but read the value in dB scale. dB is a unit which provides amplitude of radio receiver or audio amplifier. It is manifested by logarithmic figure on voltage, current or power ratio so that any calculation could be made.

1. dB Scale of Tester

Generally, the dB scale of this tester is calibrated basing upon 1mW power at 600Ω line as 0 dB.

$$P = \frac{E^2}{Z_o} \quad E = P \times Z_o = \sqrt{0.001 \times 600} = 0.775V$$

($Z_o = 600\Omega$)

As above, 0dB point is equal to the point of 0.775V should the line impedance be 600Ω.

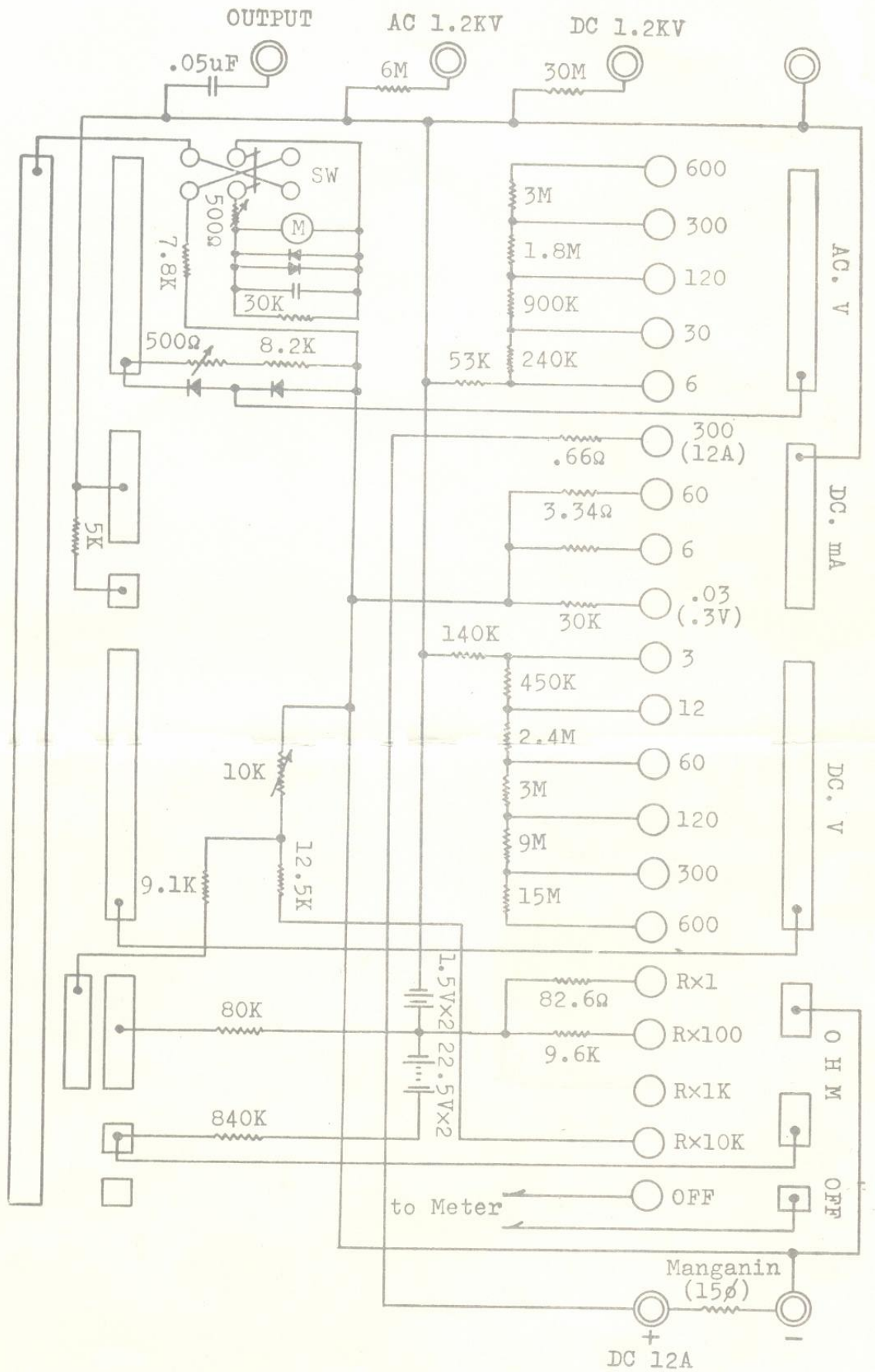
Consequently, direct reading of the dB scale is only accurate, when the line impedance is 600Ω. If not 600Ω, the value obtained by direct reading is merely comparative figures of voltage in dB.

To measure dB at the line having other impedance than 600Ω, use a special matching transformer. For example, to check voice output at the end of output transformer, provide a transformer having impedance of 8 or 16Ω in primary and 600Ω in secondary, and make connection so that the primary is related to the voice output and secondary to the tester. The value can be roughly obtained if it is kept in mind that the indicated value is always rather low because of transformer loss.

2. Positioning of Selector

Direct reading of dB could be made in the range of AC 6V with this tester. If pointer goes out of scale, change the range to 30, 120, or 300V and read the value in dB scale which corresponds to AC 6V range. Add the following figures to the indicated value.

	Range	Addition
AC.	30V range	14dB
	120V range	26dB
	300V range	34dB
	600V range	40dB



* Specifications are subject to change without notice.